

**WHAT IS CLAIMED IS:**

1. A high efficiency burner for over-cladding, which heats an optical fiber pre-form, said burner comprising:

- 5 burner covers;
- burner bodies arranged between the burner covers; and
- fuel dischargers arranged between said burner bodies in at least two rows and being divided by a partition.

10 <sup>11</sup> 2. The high efficiency burner according to Claim 1, wherein the burners bodies are operable independently of each other.

3. The high efficiency burner according to Claim 1, further comprising individual mass flow controllers for controlling a flow of gas to each respective row of said  
15 fuel dischargers.

4. The high efficiency burner according to Claim 3, wherein each individual mass flow controller is operable independently.

20 5. The high efficiency burner according to Claim 1, wherein the mass flow of gas is oxygen and hydrogen gas.

6. ~~6A~~ 6. The high efficiency burner for over-cladding of Claim 1, wherein the mass flow of gas is LPG or butane gas.
7. The high efficiency burner for over-cladding of Claim 1, wherein the fuel
- 5 dischargers include an oxygen discharger and a hydrogen discharger.
8. An apparatus for over-cladding a large diameter optical fiber pre-form, which performs an over-cladding on an optical fiber pre-form with a quartz tube, comprising:
- upper and lower fixing chucks mounted on respective upper and lower sides of
- 10 a tower;
- a handle rod connected at a first end to the upper fixing chuck;
- a first optical fiber pre-form being connected at one end to a second end of the handle rod so,
- a supplementary support quartz tube connected at a first end to the lower fixing
- 15 chuck and connected at a second end connected to another end of the first optical fiber pre-form;
- a second quartz tube inserted into the first optical fiber pre-form; and
- a burner arranged between the second end of the handle rod and the lower fixing
- chuck, said burner comprising at least two rows of fuel dischargers including an oxygen
- 20 discharger and a hydrogen discharger, and said at least two rows of fuel dischargers being divided by a partition.

9. The apparatus as recited in claim 8, wherein respective ends of the burner are operable independently when sealing a top or cutting a bottom of the second quartz tube.

5 10. The apparatus according to claim 8, wherein each row of fuel dischargers includes an individual mass flow controller.

11. The apparatus as recited in claim 10, wherein the individual mass flow controllers are operable on an independent basis, respectively.

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~~sub 12~~ 12. ~~The apparatus recited in claim 10, wherein the individual mass flow controllers are flow meters.~~